Accelerated Bridge Construction

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Arora and Associates, P.C.
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California Department of Transportation
Presentation Outline

- Accelerated Bridge Construction – Basic Need
- Emergency Response – ABC Projects/2009 Scan
- Projects Planned for ABC
- ABC Connections – 2012 Scan
- Recent Developments and Coordination efforts related to ABC (AASHTO & FHWA)
- Q&A
Why ABC ???
ABC Related “Domestic Scans“

- 2009 Scan – Accelerated Construction Practices
  - Brief Description of “Domestic Scan”

- Proposed 2012 Scan – Performance of ABC Connections
  - Discuss later…………..
Program requested by AASHTO, with funding provided by State DOT’s and managed through NCHRP

Scan topics are solicited every year for funding

NCHRP Project panel meets once a year to select proposed scan topics for funding

AASHTO and FHWA identify team & SME members

Planning meeting held – determine AQ’s & Locations to visit

Conduct the scan – one to two weeks is typical

Products – Final Report w/Implementation Plan
Emergency Acceleration

Acceleration is often in response to an accident or unexpected event. Projects accelerated under emergency situations have very compressed schedules yet they still have to be delivered following sound design, construction, and management processes.

This is the challenge!
Projects Visited

- Accelerated Bridge Construction, Utah
- I-10 Houston
- I-880 MacArthur Bridge YBI Viaduct Bay Bridge
- I-65/59 Bridges, Birmingham
- Duval St. Bridge & SR9A/I-295, Jacksonville
- Escambia Bay Bridge, I-10 (Emergency & Rebuild), Pensacola
- Russian River Bridge
- I-40 Mojave Desert
- I-15 Repave I -5 Tunnel Fire Repair
- Queen Isabella Causeway
Construction Incentive - ABC

San Francisco
I-80 Bay Bridge

Gasoline tanker fire resulted in the collapse of two spans on the I-580 connector in Oakland CA. (April 29, 2007 3:52 AM)

Completed May 24, 2007
I-40 Marble Wash Bridge (Replace)

Precast Abutment & Girder Placement
Big rigs crash in Los Angeles County - Photo 1 of 7

Trucks burn early Saturday, October 13, at a tunnel on Interstate 5 in north Los Angeles County, California, after more than a dozen big rigs crashed the night before. AP Photo
Accelerated Bridge Construction

“Plan Ahead”
## Utah Rating Procedure

<table>
<thead>
<tr>
<th>Category</th>
<th>Rating</th>
<th>Description</th>
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<tbody>
<tr>
<td>Average Daily Traffic</td>
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<tr>
<td></td>
<td>4</td>
<td>Less than 5000</td>
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<tr>
<td></td>
<td>3</td>
<td>5000 to 10000</td>
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<td>Less than 5 minutes</td>
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<td>More than 20 minutes</td>
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<td>Critical Bridge</td>
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<td>Economy of Scale (total spans)</td>
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<td>1 span</td>
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<td>2 to 3 spans</td>
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<td>4 to 5 spans</td>
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<td>More than 5 spans</td>
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<td>Some complexity, but favorable site conditions</td>
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<td>Simple geometry and favorable site conditions</td>
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<td>Safety</td>
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<td>4</td>
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<tr>
<td></td>
<td>5</td>
<td>Multiple mainline railroad tracks</td>
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</tbody>
</table>

Utah Website: http://www.udot.utah.gov/main/
* Region Director or Project Development Director to evaluate possible indirect benefits
California 2007 - ABC (SFOBB)
Utah 2007 – ABC with SPMT’s
Oregon 2008 – ABC floating Bridge
Current Developments
“Accelerated Bridge Construction”

- ABC Domestic Scan – Connections
- Prefabricated Bridge Elements and Systems (PBES)
- FHWA/AASHTO/FIU coordination
ABC Related “Domestic Scans“

- 2009 Scan – Accelerated Construction Practices (Overview)
  - Domestic Scan overview

- Upcoming 2012 Domestic Scan – Performance of ABC Connections
“Best Practices Regarding Performance of ABC Connections in Bridges Subjected To Multi-Hazard and Extreme Events”

The purpose of this scan is to:

Identify domestically used ABC connection details that perform well under extreme event loading ….
Concrete Viaduct Collapse during the 1989 Loma Prieta Earthquake

14-5 Interchange 1994 Northridge Earthquake in Southern California
1971 San Fernando
1994 Northridge

Key
“Connection” Details
UTAH
Design - *Implement Standardization*

ABC Manual and Standard Drawings
Prefabricated Bent Cap
Other Extreme Events

Landslide
Ferguson Slide, CA

Sherman Island, CA

Scour / Flooding

Irene New York

Blast

Wind / Hurricane

Hurricane Katrina
Center for Accelerated Bridge Construction (ABC) Center at Florida International University

Website: abc.fiu.edu
http://www.fhwa.dot.gov/bridge/abc
Prefabricated Bridge Elements and Systems

What is PBES?
PBES are structural components of a bridge that are built offsite, or near-site of a bridge and include features that reduce the onsite construction time and the mobility impact time that occurs when building new bridges or rehabilitating or replacing existing bridges relative to conventional construction methods.

How Does PBES Work?

How Does PBES Impact ABC?

Webinars

- Session 1
- Session 2
- Session 3
- Session 4
Subcommittee on Bridges and Structures

2011 SCOBS Annual Meeting

Shoukry Elnahal, P.E.
Deputy Chief Engineer for Bridges and Tunnels
MassDOT Highway Division
The focus of this year’s T-4 meeting was on Accelerated Bridge Construction (ABC).

FHWA Update – Claude Napier EDC Initiative

ABC Connection Details Manual – Mike Culmo

ABC/PBES Research Update – Mary Lou Ralls

FIU ABC Center Update – Kevin Thompson
We can Build Faster!
Q & A Discussion

Thank you
Topics to be considered by the scan include:

- Construction details for durable PBES and other ABC connections that have a history of good performance
- Seismic and other testing (blast) of ABC connection details
- Specialized technology and standards used in monitoring, inspecting, and repair of ABC connection details
- Relative costs for design, construction, maintenance, and inspection of ABC connection details
Connections Details for PBES

- General Topics
- Superstructure Connections
- Substructure Connections
- Foundation Connections
- Connection Design Examples
- Proprietary Products
- Sample Construction Specs
- Case Studies

www.fhwa.dot.gov/bridge/prefab/if09010/
March 11, 2011 Webinar

Gregory G. Nadeau
FHWA
Deputy Administrator

Inaugural Webinar on the National Center for Accelerated Bridge Construction
March 11, 2011
FHWA ABC Manual Webinar
Thursday, June 2, 2011

Accelerated Bridge Construction
Experience in Design, Fabrication and Erection of
Prefabricated Bridge Elements and Systems

Michael P. Culmo, P.E.
Vice President of Transportation and Structures
CME Associates, Inc., East Hartford, CT
2011 3-month Series on Full-Depth Precast Bridge Decks

Sept. 29  State-of-the-Art Full-Depth Precast Concrete Bridge Decks
by Sameh Badie representing PCI & Ben Graybeal, FHWA

Oct. 11  Field-Cast UHPC Connections in Full-Depth Precast Bridge Decks
by Ben Graybeal, FHWA

Nov. 17  Full-Depth Prefabricated Bridge Deck Options for Durability and Cost
by Bruce Johnson, Oregon DOT